Study on urban healthcare consumption in northern France

Julia SALLERON\textsuperscript{a}, Alain DUHAMEL\textsuperscript{a}, Charles SULMAN\textsuperscript{b}, Valérie DEKEN\textsuperscript{a}, Régis BEUSCART\textsuperscript{a,c}

\textsuperscript{a}CERIM, University of Lille 2, Lille, France
\textsuperscript{b}City of Lille Councillor with responsibility for Health
\textsuperscript{c}Lille Regional University Hospital, Lille, France

Abstract. In Lille (a large city in northern France), the municipal council has set up an Health Observatory in order to provide health information on the city's population, promote educational health policies, foster the development of preventive actions and improve access to the healthcare system. The Observatory works with agencies involved in health in France, such as the CPAM ("Caisse Primaire d'Assurance Maladie", the state health insurer). The purpose of the present study was to describe care consumption by the inhabitants of Lille's 12 districts on the basis of data supplied by the local branch of the CPAM. By using principal component analysis and a hierarchical classification tool, we established a typology of districts according to care consumption. The results of this study can be used to improve decision-making, elaborate better health policies and promote social actions.

Keywords: evaluation, decision support, classification, healthcare system, insurance, reimbursement

Introduction

Studies have shown that for some citizens, financial difficulties and casualization are obstacles to care access and continuity [1]. There are many disparities worldwide in terms of the consumption of medicines, and this is also the case in France. For example, narcotics consumption is twice the average of other European countries. In the Nord-Pas de Calais region (northern France), the rate of use of medicines for alcohol addiction is considerably higher than in the other French regions [2,3]. It is clear that care consumption and use of care services is not homogeneous. In Lille (a large city in the Nord-Pas de Calais region), an Health Observatory has been installed and works with local and national health agencies with a view to providing the health information that decision-makers and practitioners need in order to improve health policies. To date, studies performed on these topics have been confined to specific issues [4, 5]. This paper seeks to describe care consumption in various districts with different sociological profiles and establishes a typology of districts on that basis by using multivariate
1. Method

1.1 Data collection

Data were supplied by the CPAM of Lille (the state health insurer). The study concerns persons affiliated with the general health fund and who were resident in the locality of Lille in 2004 and 2005. These inhabitants were spread across twelve districts. Originally, 154647 beneficiaries who had not changed address between January 2004 and June 2005 were included in the study. After an initial descriptive analysis, 114 beneficiaries were excluded from the study because they presented aberrant data. The study thus concern a total of 154533 beneficiaries, for whom the following information was supplied: sociodemographic data (age, gender, status in terms of special access to care and the latter's type), the number of consultations and visits to the doctor (both general practitioners (GP) and specialists), the amount spent on dental treatment (prostheses, orthodontics) and the number of reimbursed boxes and prescriptions for all delivered medicines. Moreover, four specific medicines were identified according to the following therapeutic classes [8]: antibiotics, narcotics, tranquillizers and medicines for alcohol addiction.

1.2 Generation of indicators

Data were first aggregated by district and the following indicators were computed:

- the percentage of persons within a district having accessed a given type of care (dental treatment, prostheses, specialists, etc.), the percentage of persons having received at least one reimbursement of any type of medicine and the percentage of persons having received at least one reimbursement of the four specific drug classes indicated above.
- the mean level of care consumption for the inhabitants of each district (20 indicators): number of consultations with a GP, specialist or dentist; amount spent on prostheses, orthodontics or dentist's fees and the number of reimbursed boxes and prescriptions of medicines received by the persons concerned.
- the mean age of the inhabitants in each district, as well as the percentages receiving a guaranteed minimum welfare allowance (“RMI”), free state health insurance (“CMU”), state medical aid for non-French citizens (“AME”) or a chronic disease allowance (“ALD”).

In all, we used 39 indicators to generate a summary of care consumption and the use of care services for each district. We then perform principal component analysis (PCA) in order to select the most relevant indicators. This analysis enabled us to select 20 indicators for the remainder of the study.
1.3 Typology of districts using cluster analysis

A hierarchical cluster analysis (HCA) was performed to group together districts in which the inhabitants displayed similar behaviour in terms of care and medicines consumption. The HCA is a multivariable statistical method based on the calculation of distances between the districts; the goal is to identify clusters of districts having closely related characteristics for the 20 analyzed parameters. The number of clusters was determined by using a consensus between three statistical parameters: the cubic clustering criterion (CCC), the pseudo F and the pseudo t² (the SAS cluster procedure). In addition, we performed a factorial discriminant analysis (FDA) in order to check the quality of cluster separation. The mean values of the indicators were calculated and used to compare the clusters in an analysis of variance (ANOVA). These two analyses (FDA and ANOVA) enabled us to identify the indicators which best separated the clusters.

1.4 Radar charts

We used radar charts to represent the mean differences between the districts and the clusters, according to the indicators. Each indicator was transformed into a z-score, which is the current indicator value minus the overall mean divided by the standard deviation. The mean values for the overall population are thus always equal to 0.

2. Results

Given that use of care services differs strongly between children and adults, the results presented below concern the 125265 inhabitants over the age of 15. The mean age of this population was 42. In this population, 3% received the guaranteed minimum welfare allowance ("RMI"), 9% the chronic disease allowance ("ALD") and 12% the free state health insurance ("CMU").

2.1 District-by-district analysis

We analyzed twelve districts in the city of Lille. Figure 1 presents the results obtained for one district, called District 1, a residential area with approximately 20000 inhabitants. This district is characterized by very high unemployment rate (over 20%) and a high proportion of low social classes (35%). Many of the area's inhabitants are first-, second- or third-generation immigrants (over 25%). Radar charts enabled us to characterize this district in terms of care consumption and the use of care services.
The percentage of the district's inhabitants receiving medicines (85%) was higher than that of the general population (81%) but the mean number of prescriptions delivered was very similar (18.2 versus 18.3 in the general population) (Figure 1.a). The percentage of persons having consulted a GP was also higher (82.6% versus 78%), as was the mean number of consultations (12 versus 11). In contrast, the percentage of persons having consulted a specialist was much lower than in the general population (42% versus 51%) and the mean number of specialists consulted was lower than in the general population (1.7 versus 1.9). The percentage of the district's inhabitants receiving reimbursed antibiotics was higher than in the general population (59% versus 54%), as was the mean number of prescriptions delivered (3.2 versus 2.9).

Figure 1.b concerns reimbursed prescriptions of narcotics, tranquillizers and medicines for alcohol addiction in District 1. In this district, the percentage of persons taking treatments for alcohol dependence was the same as in the general population (0.9% versus 1%) and these individuals did not consume more than the inhabitants of the other districts (4.23 delivered prescriptions in District 1 versus 4.26 in the general population). District 1 featured a higher proportion of persons taking narcotics than in the other districts (1.54% versus 1.33%) and these individuals received more prescriptions on average than those in the other districts (16 versus 13.7). In terms of tranquillizers, District 1 has the same percentage of consumers as in the general population (29% versus 28.7%) but these individuals receive fewer prescriptions on average than in the other districts (10.3 versus 12.2).

The mean amount spent on dental treatment by District 1 inhabitants was well below the average for the general population (£374 versus €421 for dental treatment, £774 versus €843 for the orthodontics and £668 versus €836 for prostheses) (Figure 1.c). Nevertheless, the level of use of this type of care service was the same as in the other districts and was even higher for orthodontics (1.9% versus 1.4%).
2.2 Typology of districts using the hierarchical cluster analysis

Using the above-described method, the 12 districts of Lille were distributed into three clusters (Figure 2.a). ANOVA and FDA enabled us to determine the 11 indicators which were the most effective in separating the clusters. Figure 2.b shows the radar chart obtained for the three clusters. One can note that the reimbursed medicines and the use of care services differ greatly from one cluster to another.

Figure 2: Results

The above-described District 1 is part of cluster 3, formed by 3 districts which differ significantly from the general population. Firstly, the percentage of the inhabitants consulting a GP was higher than in the general population (81% versus 77%), as was the mean number of doctors consulted (13 versus 11). In contrast, few persons consulted a specialist (44% versus 51% in the general population) and the mean number of specialists consulted by these individuals was lower than that in the general population (1.5 versus 2.0). The mean amount spent on dental treatment was lower than for the overall population (€753 versus €836 in the general population for prostheses and €776 versus €841 for orthodontics). Lastly, the percentage of persons having been reimbursed for prescriptions of antibiotics (58.4%) and the mean per capita number of prescriptions delivered for these individuals (3.1) were higher than in the general population (with 2.6 delivered prescriptions and 52.8% by person respectively). The percentage of people having been reimbursed for prescriptions of medicines for alcohol addiction was higher than in the general population (1.4% vs 1%).

3. Discussion – conclusion

Although (in France, at least) municipal councils do not have direct administrative responsibility for the provision of healthcare services, an increasing number are becoming more and more concerned in the field of public health. Here, we have presented a method for characterizing use of care services and healthcare professionals
for the inhabitants of 12 districts in the locality of Lille. This method also allowed us to group together districts having similar characteristics in terms of use of care services and consumption of medicines.

This decision-making tool enables us – in the short-term – to draw up an objective overview of the nature and the extent of disparities in term of care consumption. Concretely, it informs all the decision-makers of the needs in health care. The impact of this kind of information is not immediate because it needs a reflection of the local actors to ensure its interest and its relevance. In the mid-term, it will be a question of developing a local plan in public health and of planning programs of intervention. For example, our study reveals that in some districts, people use less dental treatments. To level this disparity, an information and detection campaign could be done in the schools of this district to detect a lack of hygiene or dental problems.

This kind of database contains information on reimbursement of all care (other than during hospitalization) for all individuals, making it possible to obtain relevant information about care consumption. However, the study is limited by the nature of the data, especially for medicines: the fact that the cost of a prescription has been reimbursed to an individual does not necessarily mean that the individual has actually taken the medicine. Furthermore, (non-reimbursed) self-medication is not taken into account.

In terms of the causes of the observed inter-district differences, this study raises more questions than it resolves. A factor which is often put forward is casualization. People with the lowest income are generally more likely to suffer from certain diseases (for example, 11% of the poorest people suffer from tooth decay, versus 6% for the rest of the population [9]). Low-income individuals are also less likely to visit the doctor in general and specialists in particular. The method described in this paper could be a way of answering this question: the same type of study could be performed by replacing the districts by the level of casualization.

References

[8] European Pharmaceutical Market Research Association (EphMRA)